DATA SHEET

LS Programmable Logic Controller

XGB Positioning Module

XGB **XBF-PD02A**

- **When using LSIS equipment, thoroughly read this datasheet and associated manuals introduced in this datasheet. Also pay careful attention to safety and handle the module properly.**
- **Store this datasheet in a safe place so that you can take it out and read it whenever necessary.**

Davis Controls
A Breed Above the Rest

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Thank you for your business and your interest in LSIS solutions.

LS constantly endeavors to improve our products so that information in this datasheet is subject to change without notice.

The date of issue: 2011. 5
10310001006 Ver 3.0

■ Safety Precautions

- Safety Precautions is for using the product safely and correctly in order to prevent the accidents and danger, so please go by them.
- The precautions explained here only apply to this module. For safety precautions on the PLC system, refer to User's manual.
- The precautions are divided into 2 sections, 'Warning' and 'Caution'. Each of the meanings is represented as follows.

⚠ Warning If you violate instructions, it can cause death, fatal injury or a considerable loss of property

⚠ Caution If you violate instructions, it can cause a slight injury or a slight loss of products

- The symbols which are indicated in the PLC and User's Manual mean as follows.
  ⚠ This symbol means paying attention because of danger of injury, fire, or malfunction
- This symbol means paying attention because of danger of electric shock.
  ⚠ Store this datasheet in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user

■ Handling Precautions

- Don't drop or make impact.
- Don't detach PCB from case. It may cause problem.
- When wiring, let no foreign material go into the module. If it goes into the module, remove it.
- Don't detach the module from slot while power is on

⚠ Warning

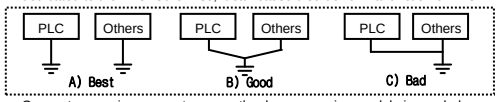
- **Do not contact the terminals while the power is applied.**
  Risk of electric shock and malfunction.
- **Protect the product from being gone into by foreign metallic matter.**
  Risk of fire, electric shock and malfunction.
- **Risk of fire, electric shock and malfunction.**
  Risk of injury and fire by explosion and ignition.

⚠ Caution

- **Be sure to check the rated voltage and terminal arrangement for the module before wiring work.**
  Risk of electric shock, fire and malfunction.
- **Tighten the screw of terminal block with the specified torque range.**
  If the terminal screw is loose, it can cause fire and electric shock.
- **Use the PLC in an environment that meets the general specifications contained in this datasheet.**
  Risk of electrical shock, fire, erroneous operation and deterioration of the PLC.
- **Be sure that external load does not exceed the rating of output module.**
  Risk of fire and erroneous operation.
- **Do not use the PLC in the environment of direct vibration**
  Risk of electrical shock, fire and erroneous operation.
- **Do not disassemble, repair or modify the PLC.**
  Risk of electrical shock, fire and erroneous operation
- **When disposing of PLC and battery, treat it as industrial waste.**
  Risk of poisonous pollution or explosion.

■ Precautions for use

- Do not Install other places except PLC controlled place.
- Make sure that the FG terminal is grounded with class 3 grounding which is dedicated to the PLC. Otherwise, it can cause disorder or malfunction of PLC



- Connect expansion connector correctly when expansion module is needed.
- Do not detach PCB from the case of the module and do not modify the module.
- Turn off power when attaching or detaching module.
- Cellular phone or walkie-talkie should be farther than 30cm from the PLC.
- Input signal and communication line should be farther than 10cm from a high-tension and a power line in order not to be affected by noise and magnetic field.

Related Manual

Read this data sheet carefully prior to any operation, mounting, installation or start-up of the product.

Name	Number	Name	Number
XG5000 (For XGI/XGR/XEC)	10310000746	XGB hardware (IEC)	10310000981
XG5000 (For XGK/XGB)	10310000511	XGB Analog	10310000862
XGI/XGR/XEC instruction	10310000739	XGB FEnet I/F	10310000854
XGK/XGB instruction	10310000509	XGB Cnet I/F	10310000736
XGB hardware	10310000893	XGB positioning module	10310001007

Revision History

Date	Version	Updated Information
2009. 06	V1.0	1. First Edition
2011. 05	V3.0	1. KOREAN/ENGLISH data sheet integrated 2. XEC Type of I/O area added 3. Smart Link => I/O Link revised 4. CI Changed

Applicable version

For system configuration, the following version is necessary.

Segment	Version
XBM-DxxxS type	V3.0 or above
XBC-DxxxH type	V1.8 or above
XEC-DxxxH type	V1.2 or above
XG5000	V3.1 or above

1. General Specifications

No	Item	Specification				Standard
1	Operating temperature	0 ~ 55℃				-
2	Storage temperature	-25 ~ 70℃				-
3	Operating humidity	5 ~ 95%RH, non-condensing				-
4	Storage humidity	5 ~ 95%RH, non-condensing				-
5	Vibration resistance	For discontinuous vibration			-	-
		Frequency	Acceleration	Amplitude	times	IEC61131-2
		10≤f＜57 Hz	-	0.075 mm	10 times in each direction for X, Y, Z	
		57 ≤f≤150 Hz	9.8㎨ (1G)	-		
		For continuous vibration				
		Frequency	Acceleration	Amplitude		
		10≤f＜57 Hz	-	0.035 mm		
		57≤f≤150 Hz	4.9㎨(0.5G)	-		
6	Shocks resistance	• Max. impact acceleration : 147 ㎨ (15G) • Authorized time : 11㎳ • Pulse wave : Sign half-wave pulse (Each 3 times in X,Y,Z directions)				IEC61131-2
7	Noise resistance	Square wave impulse noise	AC: ±1,500V DC: ±900V			LSIS standard
		Electrostatic discharge	Voltage: 4kV (Contact discharge)			IEC61131-2 IEC61000-4-2
		Radiated electromagnetic field noise	80 ~ 1,000 MHz, 10 V/m			IEC61131-2 IEC61000-4-3
		Fast transient /burst noise	Segment	Power supply module	Digital/analog input/output communication interface	IEC61131-2 IEC61000-4-4
			Voltage	2 kV	1 kV	
8	Ambient conditions	No corrosive gas or dust				-
9	Operating height	2000m or less				-
10	Pollution degree	2 or less				-
11	Cooling type	Natural air cooling				-

2. Performance Specifications

Item		Performance specification
Number of axis		2
Interpolation		2 axis linear interpolation 2 axis circular interpolation
Control method		Position, Speed, Speed/Position, Position/Speed
Control unit		Pulse
Positioning data		150 data areas for each axis (Step number 1~150) Can be set by XG5000 dedicated monitoring window or program
Data preservation When power cut		Saves parameter, operation data at Flash memory
Positioning	Positioning	Absolute/Incremental method
	Position address	-2,174,483,648 ~ 2,147,483,647
	Speed	1 ~ 2,000,000(pulse/s)
	ACC/DEC process	Trapezoid
	ACC/DEC time	0 ~ 65,535 ㎳ (Can be selected among 4 ACC patterns and 4 DEC patterns)
Max. output pulse		2,000,000(pulse/s)
Max. connection length		10m
Encoder input pulse		200 kpps
Error indication		Indicated by LED
Connection connector		40 Pin connector
Size of wire		WG #24
Occupied points		Fixed type: 64 point
Consumption current (㎃)		500㎃
Weight(g)		65g

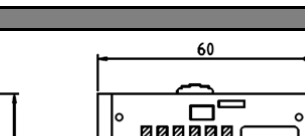
Remarks

1) The number of Positioning module can be equipped with one basic unit is related with 5V power capacity of basic unit. Total consumption power of extension unit should be in the range of power capacity of basic unit.

3. External interface IO specification

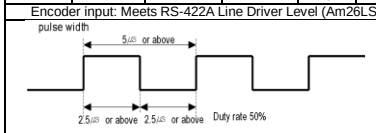
(1) Input specification

Signal	Rated input Voltage/ current	Range of voltage	On voltage/current	Off voltage/current	Input resistance	Response time
DOG	DC 24V/4.7㎃	DC 20.4 ~ 26.4V	DC 16V/3.1㎃ or above	DC 4V/1.0㎃ or less	About 5.1㏀	0.7㎳ or less
External High Limit	DC 24V/4.7㎃	DC 20.4 ~ 26.4V	DC 16V/3.1㎃ or above	DC 4V/1.0㎃ or less	About 5.1㏀	0.7㎳ or less
External Low Limit	DC 24V/4.7㎃	DC 20.4 ~ 26.4V	DC 16V/3.1㎃ or abo e	DC 4V/1.0㎃ or less	About 5.1㏀	0.7㎳ or less
In position	DC 24V/4.7㎃	DC 20.4 ~ 26.4V	DC 16V/3.1㎃ or above	DC 4V/1.0㎃ or less	About 5.1㏀	0.7㎳ or less
Origin	DC 5V/8㎃	DC4.25 ~ 5.5 V	DC 3V/3.5㎃ or above	DC 1V/0.7㎃ or less	about 670Ω	0.2㎳ or less
Manual pulse generator /Encoder input	DC 5V/10㎃	DC 4.25 ~ 5.5 V	DC 3V/3.0㎃ or above	DC 1V/1.0㎃ or less	about 470Ω	0.5㎲ or less

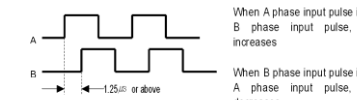


Encoder input: Meets RS-422A Line Driver Level (Am26LS31)

pulse width



Phase gap

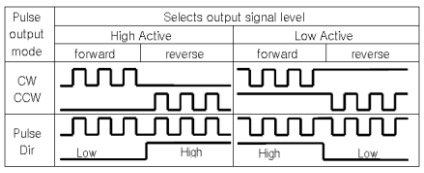


When A phase input pulse is prior to B phase input pulse, address increases

When B phase input pulse is prior to A phase input pulse, address decreases

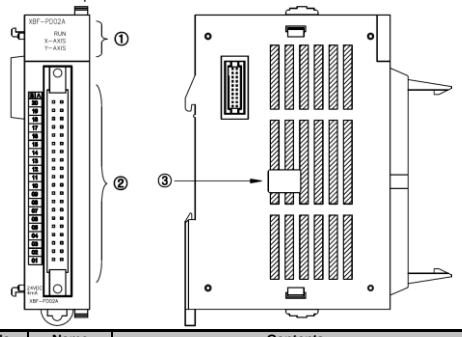
(2) Output specification

Signal	Rated load voltage	Load voltage range	Max. load current /Inrush current	Max. voltage drop when On	Leakage current when Off	Response time
Deviation count clear	DC 5~24V	DC 4.75~26.4V	0.1A(1 point) /0.4A 10㎳ or less	DC 1V or less (rating) DC 2.5V or less (max.)	0.1㎃ or less	0.1㎳ or less
Pulse output	▷ Differential line driver meeting Am26C31 ▷ CW/CCW type, PLS/DIR type can be selected program and I/O parameter of XG5000 ▷ pulse output mode, relation with pulse output level is as follows.					



4. Parts Name and Descriptions

(1) Name of each part



No.	Name	Contents
①	Operation indication LED	1. RUN : On when power is supplied 2. X_AXIS, Y_AXIS ▶On: Now Running ▶Flickering: relevant axis error
②	Connector for external wiring	Connector to connect with Driver, mechanical nput, manual pulse generator, etc.
③	O/S mode dip switch	Dip switch for setting operation or O/S download mode

(2) Interface with external

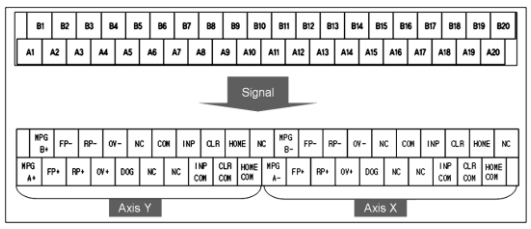
Item	Pin No. X	Pin No. Y	Signal		Signal direction module - external
Function for each axis	B20		MPG A+	Manual pulse generator Encoder A+ input	←
	A20		MPG A-	Manual pulse generator Encoder A- input	←
	B19		MPG B+	Manual pulse generator Encoder B+ input	←
	A19		MPG B-	Manual pulse generator Encoder B- input	←
	A18	B18	FP+	Pulse output (differential +)	→
	A17	B17	FP-	Pulse output (differential -)	→
	A16	B16	RP+	Pulse sign (differential +)	→
	A15	B15	RP-	Pulse sign (differential -)	→
	A14	B14	0V+	High limit	←
	A13	B13	0V-	Low Limit	←
	A12	B12	DOG	DOG	←
	A11	B11	NC	Not used	
	A10	B10			
	A9	B9	COM	Common(OV+,OV-,DOG)	⇔
	A8	B8	NC	Not used	
	A7	B7	INP	In position signal	←
	A6	B6	INP COM	DR/INP signal Common	⇔
	A5	B5	CLR	Deviation counter clear signal	→
	A4	B4	CLR COM	Deviation counter clear signal Common	⇔
	A3	B3	HOME +5V	Origin signal (+5V)	←
	A2	B2	HOME COM	Origin signal (+5V) Common	⇔
	A1	B1	NC	Not used	

(3) Interface when you use I/O link board

Wiring can be easy by connecting I/O link board and I/O connector when using XGB positioning module
Available I/O link board and I/O cable is as follows

I/O link		Connection cable		
Name	No. of pin	Name	Length	Description
TG7-1H40S	40	C40HH-10SB-XBI	1m	To connect extension module(40Pin)

When wiring XGB positioning module by using TG7-1H40S and C40HH-10SB-XBI, relation between each terminal of I/O link board and I/O of positioning module is as follows.



5. Wiring

(1) Connection length between positioning module and driver device is max. 10m. But there is some difference according to specification of driver device.
(2) When wiring I/O, avoid power ling and main circuit line.
(3) Let the length of connection cable as short as possible.
(4) Separate AC line and external I/O signal of positioning module so that I/O signal is not affected by surge or induction noise generated at AC line.
(5) Use stable power as external power (DC5V, DC24V).
(6) When wiring, if wire is close to high temperature device or contacts with oil, it may be the reason of short

6. Dedicated instruction

No.	Type	instruction	contents	Operation condition
1	Module information	SRD	Reads operation status	Level
2	Parameter	TBP	Sets basic parameter	Edge
3		TCP	Sets common parameter	
4		THP	Sets homing parameter	
5		TSP	Sets I/O signal parameter	
6	Auto operation	ORG	Starts homing	
7		DST	Direct start	
8		IST	Indirect start	
9		LIN	Linear interpolation	
10		CIN	Circular interpolation	
11		SST	Synchronous start	
12	Manual operation	INCH	Inching operation	Edge
13	Subsidiary operation	SSP	Position synchronization	
14		SSS	Speed synchronization	
15		POR	Position override	
16		SOR	Speed override	
17		PSO	Speed override at specific position	
18		VTP	Speed/Position conversion	
19		PTV	Position/speed conversion	
20		SNS	Changes start step number	
21		SRS	Changes repetition step number	
22		STP	Deceleration stop	
23	Teaching	TEA	Single teaching	
24		TEAA	Multiple teaching	
25		TWR	Sets multiple teaching data	
26	Data	TMD	Sets operation data	
27		WRT	Saves parameter/operation data	
28	error	CLR	Error reset	
29	Encoder	EPRS	Encoder preset	
30	others	EMG	Emergency stop	
31		MOF	Cancels M code	
32		PRS	Current position preset	
33		FLT	Sets floating origin	

7. I/O area

(1) XBC/XBM Type

Signal direction: PLC CPU ← positioning module		Signal direction: PLC CPU → positioning module	
Input signal	Contents	Output signal	Contents
Uxy.00.0 ~ Uxy.00.E	Not used	Uxy.01.0	X forward JOG
		Uxy.01.1	X reverse JOG
		Uxy.01.2	X JOG LOW speed/HIGH speed
		Uxy.01.3	Y forward JOG
		Uxy.01.4	X complete signal clear
		Uxy.01.5	Y reverse JOG
		Uxy.01.6	Y JOG LOW speed/HIGH speed
		Uxy.01.7	Y complete signal clear
Uxy.00.F	Positioning module operation ready	Uxy.01.8 ~ Uxy.01.F	Not used

(2) XEC Type

Signal direction: PLC CPU ← positioning module		Signal direction: PLC CPU → positioning module	
Input signal	Contents	Output signal	Contents
%UXx.y.0 ~ %UXx.y.14	Not used	%UXx.y.16	X forward JOG
		%UXx.y.17	X reverse JOG
		%UXx.y.18	X JOG LOW speed/HIGH speed
		%UXx.y.19	Y forward JOG
		%UXx.y.20	X complete signal clear
		%UXx.y.21	Y reverse JOG
		%UXx.y.22	Y JOG LOW speed/HIGH speed
		%UXx.y.23	Y complete signal clear
%UXx.y.15	Positioning module operation ready	%UXx.y.0 ~ %UXx.y.14	Not used

8. Initial installation and parameter setting

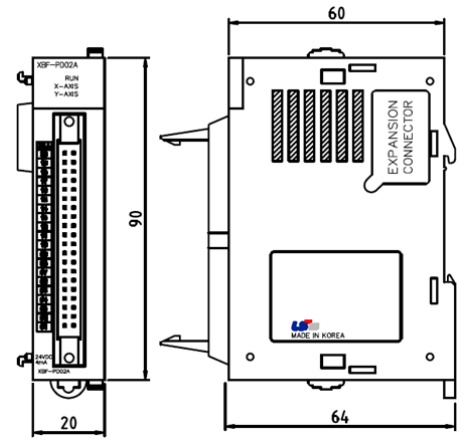
This section explains the initial installation and parameter setting method of APM (Advance Positioning Module). The following procedures should be followed in order.

(1) Wire the pulse output terminal of positioning module and the pulse input terminal of motor drive. Refer to the motor drive user's manual for the accurate wiring.
(2) Connecting input signal terminal is not necessary for the initial setting and test.
(3) Connect to positioning module through XG5000. (Refer to the user's manual for the usage of XG5000.)
(4) Open a new file after connection.
(5) Use the monitoring function of the XG5000 to check the input signals on the external signal window. All input signals are displayed as Off.
(6) The settings of the pulse output mode of basic parameter in XG5000 and pulse input mode of motor drive are identical. Refer to driver's user manual and confirm the current pulse input mode of motor drive. Thereafter set all input signal parameters as A contact point.
(7) Download the parameters and operating data using Data Read/Write of XG5000 monitoring window. If downloading is not performed, the parameters and operating data will not be set.
(8) After completing download, execute the JOG operation to check the forward and reverse operation. Error should not be expected, but if it occurred, take proper measures.
(9) If the motor does not operate and the operation displayed on the monitoring window is normal, execute 8) after confirming 1), 6), and 7). It happens if the wiring of pulse output terminal or setting of pulse output mode in basic parameter is incorrect.
(Sometimes, because of parameter setting state of motor drive, it may not operate. If the wiring of motor drive and pulse output mode are normal, check the parameter settings of motor drive.)
(10) If motor operates normally, wire the external input signals according to the system configuration. Set and download the proper operating data and parameters in the XG5000. (The state of the external input signals can be checked in the external signal window.)
(11) High limit, lower limit, Inposition signal doesn't operate normally when operation condition doesn't coincide with setting of I/O signal. So consider operation condition
(12) Make a program according to the system configuration using XG5000.

Remarks

1) For the test operation in monitoring window, change the CPU in STOP mode because the program could affect the test operation.

9. Dimension (㎜)



10. Warranty

(1) Warranty period
LSIS provides an 18-month-warranty from the date of the production.
(2) Warranty conditions
For troubles within the warranty period, LSIS will replace the entire PLC or repair the troubled parts free of charge except the following cases.
(a) The troubles caused by improper condition, environment or treatment except the instructions of LSIS.
(b) The troubles caused by external devices.
(c) The troubles caused by remodeling or repairing based on the user's own discretion.
(d) The troubles caused by improper usage of the product.
(e) The troubles caused by the reason which exceeded the expectation from science and technology level when LSIS manufactured the product.
(f) The troubles caused by natural disaster.
(3) This warranty is limited to the PLC itself only. It is not valid for the whole system which the PLC is attached to.